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PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

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PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY

(PCT Rule 71.1)

Date of mailing
(day/month/year) 27.12.2005

Applicant's or agent's file reference
WO 38951

IMPORTANT NOTIFICATION

International application No.
PCT/EP2004/001069

International filing date (day/month/year)
05.02.2004

Priority date (day/month/year)
05.02.2004

Applicant
HONEYWELL INTERNATIONAL INC et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international
preliminary examining authority:





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PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
 (Chapter II of the Patent Cooperation Treaty)
 (PCT Article 36 and Rule 70)

Applicant's or agent's file reference WO 38951	FOR FURTHER ACTION See Form PCT/PEA/416	
International application No. PCT/EP2004/001069	International filing date (<i>day/month/year</i>) 05.02.2004	Priority date (<i>day/month/year</i>) 05.02.2004
International Patent Classification (IPC) or national classification and IPC H02P7/635, H02P7/62, H02P21/00		
Applicant HONEYWELL INTERNATIONAL INC et al.		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p style="margin-left: 20px;">a. <input checked="" type="checkbox"/> <i>sent to the applicant and to the International Bureau</i> a total of 3 sheets, as follows:</p> <div style="margin-left: 40px;"> <input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. </div> <p style="margin-left: 20px;">b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>		
<p>4. This report contains indications relating to the following items:</p> <div style="margin-left: 20px;"> <input checked="" type="checkbox"/> Box No. I Basis of the opinion <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input type="checkbox"/> Box No. VIII Certain observations on the international application </div>		
Date of submission of the demand 13.09.2005	Date of completion of this report 27.12.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tlx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Davis, A Telephone No. +31 70 340-2097 	

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/001069

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

Description, Pages

1-24 as originally filed

Claims, Numbers

1-13 as amended (together with any statement) under Art. 19 PCT

Drawings, Sheets

1/7-7/7 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/001069

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-13
	No: Claims	
Inventive step (IS)	Yes: Claims	1-13
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-13
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/EP2004/001069

Re Item V.

- 1 The following document is referred to in this communication:
D1 : US 5 907 228 A (BORNARD GUY ET AL) 25 May 1999 (1999-05-25)

- 1.1 The documents D2, D3 were not cited in the international search report.
D2: US 3 974 428 (Hafle)
D3: US 3 836 756 (Yamamoto et al.)

2 INDEPENDENT CLAIM 1

- 2.1 The present application meets the criteria of Article 33(1) PCT, because the subject-matter of claim 1 new in the sense of Article 33(2) PCT and furthermore does not appear to be arrived at by obvious modification of the closest prior art and therefore also fulfils the requirements of inventive step, Article 33(3) PCT.

Document D1 discloses (the references in parenthesis applying to this document):

a system which is 'suitable for' driving a compressor in which the different voltages are generated to drive an induction machine(1). In the DTC (direct torque control) method of D1 these voltages represent the demanded torque and flux of a particular setpoint. Fig. 1 and the table in column 2 of D1 illustrate this.

However the setpoints mentioned in D1 are not converted to a frequency prior to being used to determined the inverter driving pattern/frequency and whilst it is known (see D2/D3) to use frequency signals as setpoints in a machine drive it is not a straightforward modification of the prior art (D1) to use frequency signals for both field and voltage as is claimed in present claim 1.

Thus the skilled person in contemplating a simplification of the circuit of D1 would not be led in a straightforward way to the solution provided in claim 1.

Therefore claim 1 fulfils the requirements of inventive step (Article 33(3) PCT).

3 DEPENDENT CLAIMS

- 3.1 Claims 2 to 13 are dependent on claim 1 and as such also meet the requirements of

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/EP2004/001069

the PCT with respect to novelty and inventive step.

Enclosure of December 2, 2005

WO-Patent Application No.: PCT/EP2004/01069
HONEYWELL INTERNATIONAL INC.
Our Ref.: WO 38951

New claims 1 to 13

1. A system for driving a compressor, comprising
an induction motor (2) for driving the compressor
(3a), said induction motor including a squirrel cage
rotor, and
5 a controller (1) for controlling the induction
motor, said controller comprising
a memory (47) for storing drive patterns for driving
the induction motor,
a first frequency generation means (43) for
10 generating a field frequency based on a field command
and/or
a second frequency generation means (44) for
generating a voltage frequency based on a voltage
command,
15 wherein a drive pattern is extracted from the memory
based on the generated frequency or frequencies.
2. The system according to claim 1, wherein the
controller comprises a processing means (42) for
20 generating the field command and/or the voltage command
based on an input request.
3. The system according to claim 1, wherein the
controller is adapted to distinguish between a steady
25 state and a transient state of the induction motor.

4. The system according to claim 3, wherein the processing means (42) is adapted to generate the field command and/or the voltage command depending on the state of the induction motor.

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5. The system according to claim 4, wherein the field command and/or voltage command is generated based on look-up tables.

10 6. The system according to claim 4, wherein the field command and/or voltage command is generated based on a model based control.

15 7. The system according to claim 1, wherein the first and/or the second frequency generation means (43, 44) is a voltage controlled oscillator.

8. The system according to claim 1, further comprising a counter (45, 46) receiving the frequency output of the frequency generation means (43, 44),

20 wherein the counter is adapted to count a value based on the frequency of the frequency generation means, and

the frequency is used as an address for accessing the memory (47).

25 9. The system according to claim 1, wherein the first frequency generation means (43) for generating the field frequency and the second frequency generation means (44) for generating a voltage frequency is used, wherein the memory (47) is accessed by using a first address and a second address, and the system further comprises a first counter (45) and a second counter (46), wherein the first counter is adapted to count a value based on the frequency of the first frequency generation means,

and the second counter is adapted to count a value based on the frequency of the second frequency generation means, wherein

the count value of the first frequency generation means is used as the first address, and the count value of the second frequency generation means is used as a second address.

10. The system according to claim 9, wherein one of the first and second addresses is a column address, and the other address of the first and second addresses is a line address.

11. The system according to any of the claims 1 to 10, wherein the compressor (3a) is a part of a turbocharger (3).

12. The system according to any of the claims 1 to 10, wherein the compressor is an electrically driven compressor.

13. The system according to any of the claims 1 to 10, wherein the compressor is part of an electrically assisted turbocharger.

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